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SCIENCE RESOURCES STUDIES HIGHLIGHTS

NATIONAL SCIENCE FOUNDATION WASHINGTON, D.C. 20550 NSF 80-319 SEPTEMBER 26, 1980

March Cutback in Federal Budget Leaves Strong Defense R&D Growth in 1981—Other Areas Lag

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The following data are taken from a special report, *Federal R&D Funding by Budget Function: Fiscal Years 1979-81*, relating to the current budget period. Data show funding levels as presented in the President's 1981 budget in January and also the revisions made in March. Of the 15 budget functions with R&D components one, **general science, space and technology** is divided for purposes of the report into two functions: **Space research and technology** and **general science.** Data are based on information provided by the agencies for "Special Analysis K: Research and Development" in the 1981 budget; on further detailed program information in agency budget justification documents; on *Fiscal Year 1981 Budget Revisions, March 1980* and a paper, "Research and Development Revisions to the Fiscal Year 1981 Budget," dated April 17, 1980, both issued by the Office of Management and Budget (OMB); and on budget amendment justifications issued by the agencies. All data are shown in budget authority dollars rather than obligations or outlays, since budget authority is the basis of congressional funding decisions. R&D plant data are excluded.

Highlights

- The President's 1981 budget, as amended in March, included total Federal R&D budget authority of $35.5 billion (R&D plant excluded), or 12 percent more than the $31.8 billion shown for the 1980 revised total (chart 1). While still somewhat ahead of anticipated inflation, this increase was less than the 14-percent increase for R&D programs shown in the original 1981 budget.[1]

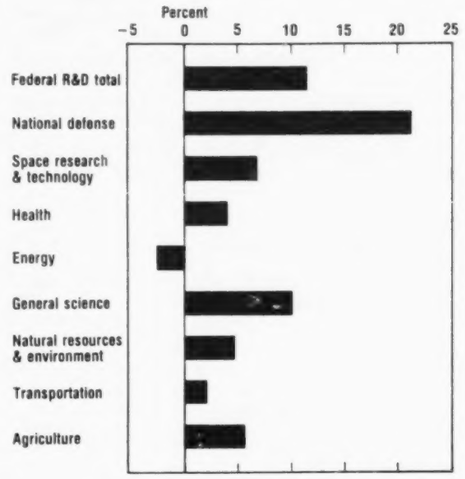
- National defense was the only one of the four leading functional areas of R&D support for which the relative increase—21 percent—was unchanged after budget revisions. The increase for space research and technology was 7 percent, compared with 11 percent originally, and for health, 4 percent, compared with 6 percent originally. A 2-percent decrease for energy R&D programs compared with an initial 1-percent decrease.

- General science ranked fifth in R&D funding and was the only major function besides national defense that reflected growth equal to projected 1981 inflation after the budget revisions.[2] Proposed growth of 10 percent for general science in 1981 compared with 15 percent proposed in January.

[1] The rate of inflation anticipated by OMB for fiscal year 1981 is 9.9 percent compared with 9.5 percent for fiscal year 1980. (See Office of Management and Budget, *Mid-Session Review of the 1981 Budget* (Washington, D.C., July 21, 1980.))

[2] Major functions are defined as those with current annual R&D funding levels of $500 million or more.

Chart 1. Percent change in R&D funding for major functions[a] in the 1981 Federal budget (revised): FY 1980-81



[a] Shown in descending order of 1981 R&D budget authority.

SOURCE: National Science Foundation

Prepared in the Government Studies Group, Division of Science Resources Studies

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• In the case of defense, health, and energy the 1981 budget represented a notable departure from previous funding trends. The 1981 increase for national defense exceeded by far the 7.0-percent average annual growth rate recorded between 1971 and 1980; for health, however, the 1981 increase was well below the previous 9-year average of 12.3 percent, and for energy the projected decrease contrasted sharply with the 23.3-percent average annual increase shown in the earlier period. Even though recent Presidential budgets had requested minimal increases or decreases for health and energy R&D levels, congressional actions later added funds that made for high long-term growth rates. In the case of space and general science, however, the 1971-80 average annual rates of growth of 4.7 percent and 10.4 percent, respectively, were both close to the 1981 (and earlier) budget increases (table 1).

• Basic research support is found in almost all functional areas, although health and general science together account for more than three-fifths of all such support. In the January budget for 1981 the administration continued to provide real growth for overall basic research funding—an increase of 12 percent in budget authority, for a total of $5.1 billion. After budget reductions—aimed mostly at space, general science, and health programs—the basic research total was $4.9 billion, and the relative increase was 8 percent, or less than anticipated inflation (table 2).

The 1981 Budget

The President's budget for fiscal year 1981, as presented in January 1980, embodied a continued strategy of restraint, with real increases limited to areas of high priority, such as defense energy, youth training, and basic research.[1] By March, however, the rapid pace of inflation led to the adoption of a new strategy that included reductions on the part of all major agencies in an effort to counter inflationary forces.

A number of 1981 R&D programs were reduced through budget amendments, and some rescissions in 1980 programs were also proposed. The new R&D total of $35.5 billion in budget authority was 2 percent lower than the 1981 R&D total in January, and the estimate for 1980 was 1 percent below the original estimate for that year. Despite the reductions, the R&D portion of the budget still reflected a growth rate ahead of projected inflation although basic research was no longer funded at a level that would allow for real growth.

[1] Energy R&D programs declined in real terms even though the overall energy function showed growth.

Table 1. Federal R&D funding by budget function:[1] fiscal years 1971-81
[Dollars in millions]

Function	Actual		Estimates					
	1971	1979	1980			1981		
			January	March reduction	Revised request	January	March reduction	Revised request
Total	15,543	29,040	32,050	-205	31,845	36,397	-868	35,528
National defense	8,110	13,791	15,002	-43	14,959	18,135	-19	18,117
Space research and technology	3,048	3,969	4,606	—	4,606	5,119	-201	4,918
Health	1,288	3,401	3,682	-32	3,650	3,887	-94	3,792
Energy	556	3,461	3,834	-69	3,765	3,799	-124	3,675
General science	513	1,119	1,246	—	1,246	1,435	-64	1,371
Natural resources and environment	416	1,010	1,090	—	1,090	1,144	-4	1,140
Transportation	728	799	871	-12	860	917	-41	876
Agriculture	259	552	604	-3	602	640	-6	634
Education, training, employment, and social services	215	354	497	-39	457	639	-299	341
Community and regional development	65	127	126	-8	118	143	-6	137
International affairs	32	117	127	—	127	135	—	135
Veterans benefits and services	63	123	126	—	126	135	-5	130
Commerce and housing credit	90	92	107	—	107	119	-5	114
Income security	145	57	63	—	63	80	—	80
Administration of justice	10	47	48	—	48	46	—	46
General government	7	23	21	—	21	23	—	23

[1] Listed in descending order of 1981 R&D budget authority. Data for 1971 are shown in obligations; data for 1979-81 are shown in budget authority.

NOTE: Detail may not add to totals because of rounding. Source: National Science Foundation

The relative increase originally proposed for national defense R&D programs was retained. All other major functions except natural resources and environment showed a decline in the originally projected rates of increase or—in the case of energy—a greater rate of decrease. The share of R&D programs within the overall 1981 and 1980 totals was 5.1 percent each year compared with 5.2 percent within the 1979 total.

R&D Programs by Function

• **National defense** R&D programs, sponsored by two agencies—the Department of Defense (DOD) and the Department of Energy (DOE)—were expected to increase by 21 percent in the revised 1981 budget. The share of national defense within the Federal R&D total in 1981 rose to an estimated 51 percent (about the same as in 1971) compared with 47 percent in 1980, an indication of the renewed emphasis placed on defense relative to other programs (chart 2).

The largest share of the increase for DOD programs in 1981 is found in strategic programs; strategic and tactical programs together account for more than one-half of the increase. Budget proposals for DOD mission areas in 1981 are as follows: An increase of 20 percent in *technology base* programs, including an increase of 18 percent for basic research; a decrease of 4 percent for *advanced technology* programs; an increase of 54 percent in *strategic* R&D programs, mostly caused by an $881 million increase for the M-X intercontinental ballistic missile; an increase of 10 percent in *tactical* R&D programs, which are all directed to development of combat systems for general purpose forces; and an increase of 35 percent in *intelligence and communications* R&D programs.

DOE *atomic energy defense activities* were scheduled to increase 14 percent after slight budget cutbacks in March. The weapons R&D and testing activity, more than one-half of the defense atomic energy R&D total, is expected to grow by 13 percent. Naval reactors development, next in size, is expected to increase only 4 percent. Inertial confinement fusion activities directed toward nuclear weapons development, testing and simulation show proposed growth of 39 percent, and defense waste management, proposed growth of 29 percent.

• **Space research and technology** received the largest dollar reduction in the budget revisions of any major function. Space is now expected to grow 7 percent in R&D funding in 1981 compared with 11 percent originally. All the activities are conducted by the National Aeronautics and Space Administration (NASA). This function accounted for an estimated 14 percent of the Federal R&D total in 1981, the same share as in 1980. The comparable share in 1971 was 20 percent.

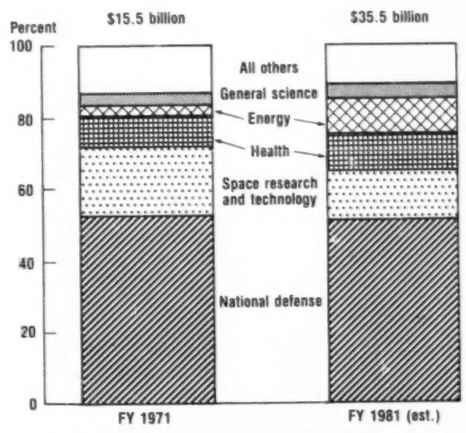
Most funding continues to be directed to *space transportation systems* (STS) wherein the largest program is the space shuttle, now scheduled for a manned orbital test flight in 1981. A cut in space flight operations will slow work on the inertial upper stage (IUS), thus postponing the international solar polar mission to 1985.

The next broad area of NASA activity is *space science, applications, and technology*, and within this area the cutback of the space science program is proportionately the greatest. Reductions include postponement of the science portion of the solar polar mission as well as shuttle spacelab science activities. Work on the space telescope was not reduced, however, and a new 1981 project, the gamma ray observatory, was retained. Under space and terrestrial applications the Landsat-D program is scheduled for an even larger increase to cover development costs, although the operational land observing system will now not be funded in 1981. The earth radiation budget experiment is reduced, but important increases are retained for the geodynamics and agricultural remote sensing (AgRISTARS) programs in 1981.

• **Health** R&D budget authority reflects an increase of 4 percent in the 1981 revised budget, compared with 6 percent originally. Almost all the programs within this function are sponsored by the Department of Health and Human Services (HHS). The biomedical research activities of the National Institutes of Health (NIH) within HHS account for approximately 85 percent of the health R&D total. The next largest source of support is the Alcohol, Drug Abuse, and Mental Health Administration (ADAMHA), also within HHS. The health function accounts for 11 percent of the Federal R&D total in 1981. The health share in 1971 was 8 percent.

Most of the NIH institutes show small relative increases, or none, in the 1981 proposals. Work on cancer

Chart 2. Share of leading functions in the Federal R&D total



SOURCE: National Science Foundation

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is scheduled for a slight decline, and heart research is expected to increase by only 3 percent. The exceptions are environmental health, up 13 percent, and arthritis, metabolism, and digestive diseases, up 9 percent. An increase of 11 percent is given to R&D programs in the mental health area to implement recommendations of the President's Commission on Mental Health.

- **Energy** is the only major function to show a decrease in the overall R&D program level in 1981—2 percent, compared with a 1-percent decrease originally. Most energy programs are sponsored by DOE, the rest by the Nuclear Regulatory Commission (NRC), the Environmental Protection Agency (EPA), and the Energy Security Trust Fund (ESTF). Energy represents 10 percent of all Federal R&D budget authority in 1981. This compares with 4 percent in 1971.

  Among DOE programs the largest continues to be nuclear fission. This program is scheduled for a sharp reduction—22 percent—in 1981, mostly the result of decreases in breeder reactor work, including termination of the Clinch River breeder reactor. The next largest DOE program is fossil energy, and in this area a reduction from 1980 in the January budget was carried further in the revised budget. Reductions were made in coal but not in petroleum and gas R&D programs.[4] DOE programs in solar and geothermal energy and in magnetic fusion are scheduled for significant increases.

  The ESTF covers a new program to aid in technology development for large-scale production of synfuels; this was cut back in the budget revisions.

- **General science** now shows an increase of 10 percent in R&D funding in 1981, compared with a 15-percent increase in the original budget. The programs that fall within this function are viewed as contributing to the Nation's scientific base in the broadest sense. All the R&D programs of the National Science Foundation (NSF) and the three basic sciences programs of DOE are included in this function. General science programs make up 4 percent of the 1981 overall R&D total. The comparable share in 1971 was 3 percent.

  NSF programs are scheduled to grow 10 percent in 1981 with a significant gain shown in mathematical and physical sciences and high relative gains shown in cross-directorate and ocean drilling programs despite budget amendments. An increase of 10 percent is shown in DOE research programs, including a $22 million increase for high-energy physics.

- **Natural resources and environment** R&D programs reflect an increase of 5 percent in 1981. Budget revisions were minimal. The conservation and land management area shows an increase of 10 percent, covering expanded programs of the Forest Service within the Department of Agriculture (USDA). The pollution control and abatement area, entirely made up of EPA programs, shows an increase of 7 percent, including strong emphasis on solid waste and toxic substances research programs. Most other programs, such as those of the National Oceanic and Atmospheric Administration (Commerce), the Geological Survey (Interior), and Bureau of Mines (Interior), show almost level funding. In the 1981 budget the R&D programs under natural resources and environment account for 3 percent of the Federal R&D total, the same share as in 1971.

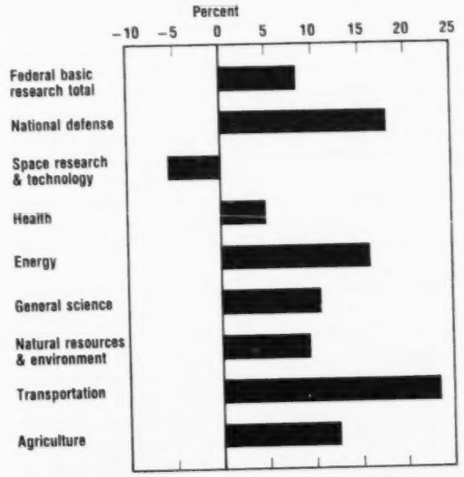
  The two remaining major functions are **transportation** and **agriculture**, each representing 2 percent of all Federal R&D programs in 1981. Each of these functions is scheduled for insubstantial gains on an overall basis. Transportation includes a new cooperative automotive basic research program, funded from the energy windfall profits tax (the source for the ESTF). The other eight functions together account for 3 percent of the Federal R&D total in 1981.

[4] Funding for R&D plant is not included in the function report. An increase of $344 million to $450 million was requested for R&D plant in support of the coal program in 1981.

Basic Research by Function

In the January budget the increase in budget authority for basic research was 12 percent, sufficient for real growth, thus continuing a Presidential policy initiated in the 1977 budget. After the March reductions the relative increase became 8 percent, or less than the

Chart 3. Percent change in basic research funding for major functions[a] in the 1981 Federal budget (revised): FY 1980-81



[a] Shown in descending order of 1981 R&D budget authority.
SOURCE: National Science Foundation

Table 2. Budget authority for basic research by function: fiscal years 1979-81
[Dollars in millions]

Function	1979 actual	1980			1981		
		January estimate	Proposed reduction	Revised estimate	January estimate	Proposed reduction	Revised estimate
Total	$4,108	$4,527	-$16	$4,511	$5,068	-$192	$4,876
Health	1,579	1,724	-13	1,711	1,831	-36	1,795
General science	1,026	1,138	—	1,138	1,309	-49	1,259
National defense	365	441	-2	439	533	-15	518
Space research and technology	440	454	—	454	490	-61	429
Agriculture	222	245	-1	244	277	-3	274
Energy	172	198	—	198	236	-7	229
Natural resources and environment	131	139	—	139	152	—	152
Transportation	75	85	—	85	113	-8	105
Education, training, employment, and social services	59	62	—	62	73	-8	65
Commerce and housing credit	10	12	—	12	20	-5	15
Community and regional development	8	8	—	8	13	—	13
Veterans benefits and services	10	10	—	10	11	—	11
Administration of justice	10	10	—	10	10	—	10
Income security	1	1	—	1	1	—	1
General government	(a)	(a)	—	(a)	(a)	—	(a)
International affairs	—	—	—	—	—	—	—

[a] Less than $500,000.

Source: National Science Foundation

rate of inflation, the first real decline in five years. Total budget authority for basic research in 1981 is now an estimated $4.9 billion (table 2).

Chief areas to receive funding reductions were space, general science, and health. The largest cuts in basic research were for NASA and NSF, the two agencies whose programs are primarily research and/or development. While most leading functional areas still show real increases in funding for basic research, the constant-dollar decrease for health, the leading area, and the decrease for space, even in current dollars, strongly influenced the overall Federal support level for 1981 (chart 3).

Health represents almost two-fifths of all Federal basic research support, and general science represents one-fourth. National defense, the third functional area in amount of basic research support in 1981, accounts for slightly more than one-tenth. The growth in defense support is part of an established DOD policy to provide substantial real growth in technology base programs in order to maintain a lead in U.S. military technology. The defense area shows an increase of 18 percent in basic research funding in the revised budget, compared with 21 percent before the revision.

Space, which had moved to fourth place (from third) in amount of 1981 support even before the revision, is now expected to show an absolute decline (6 percent) in basic research funding, the only functional area with a lower funding level in 1981 than 1980. The most important cuts in space were related to the postponement of the solar polar mission and shuttle spacelab activities.

Most leading support areas continue to show growth equal to or ahead of anticipated inflation in 1981 (revised). Aside from space, the exceptions to such growth are health (up 5 percent) and natural resources and environment (up 9 percent). An unusually large relative increase—24 percent—is shown for basic research within transportation, even after the budget revision. Most of this increase is related to the proposed automotive basic research program, although the entire cut in basic research support in transportation was made in this program.

Copies of *Federal R&D Funding by Budget Function: Fiscal Years 1979-81* are obtainable upon request from the Division of Science Resources Studies, National Science Foundation, Washington, D.C. 20550.

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